

THE MORTALITY OF THE LARGE TOWNS OF THE BRITISH ISLANDS IN RELATION TO WEATHER*

THE materials for this inquiry have been obtained from the Weekly Reports of the Registrars-General for England and Scotland for the ten years, 1865-74. The data discussed embrace returns of deaths from all causes and at all ages, deaths of persons under one year of age, of persons above sixty years of age, and deaths from diarrhoea. The weekly averages have been calculated on the annual rate of mortality per 1,000 of the population.

The results for every one of the large towns show during the

winter months an excess above the average mortality. As regards the English towns, that excess is greatest at Norwich, Wolverhampton, and Nottingham, and least at Bradford, Leeds, Salford, and most other towns in the north. In Scotland the winter excess is greatest at Aberdeen, and least at Leith and Greenock. At Dublin, the largest monthly mortality, 22 per cent. above the weekly average, occurs during February and March, being from a month to six weeks later than the time of the maximum of the English and Scottish towns.

In all the English towns, the minimum mortality of the year is in the spring months, the amounts below the averages of each town being greatest at Norwich, Wolverhampton, Birmingham, Leicester, and Nottingham. In Scotland, on the other hand,

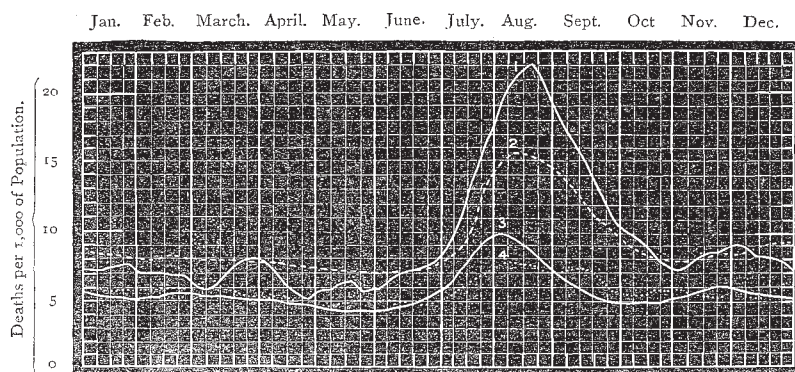


FIG. 1.—Showing the Weekly Deaths among Infants under one year of age on the Annual Mortality per 1,000 of the whole population. For Leicester, Curve 1; Liverpool, 2; London, 3; and Bristol, 4.

autumn is the healthiest season. In Glasgow and Edinburgh the deaths fall about 20 per cent. below the average in the month of September.

It is, however, to the summer death-rate that the greatest interest attaches, since it is during the hottest weeks of the year that the differences in the rates of mortality of the different British towns stand most prominently out. During the period of high temperature in summer, *every one of the large towns of England shows an excess of deaths above the average*, with the single exception of Bristol, at which place, while there occurs an increased mortality at this season, it only comes near to, but never quite reaches, the average. As regards the time of absolute maximum, it occurs in London in the end of July, but at other places more

generally about the beginning and middle of August. Taking any two consecutive weeks which indicate the highest mortality, the excess per cent. above the average is for Wolverhampton, 6; Manchester, 8; Portsmouth, 12; London, 14; Hull, 20; and Leicester, 47. The excess above the average at Leicester being thus eight times greater than that of Wolverhampton.

In Scotland no town exceeds its average during the hottest weeks of the year, but on the contrary the death-rate everywhere is under the average, and in most cases very considerably so. At Aberdeen the rate below the average is 18 per cent. during each of the months, July, August, and September; and at Dublin the annual minimum occurs in July, when the death-rate falls 25 per cent. below the average during the second and third

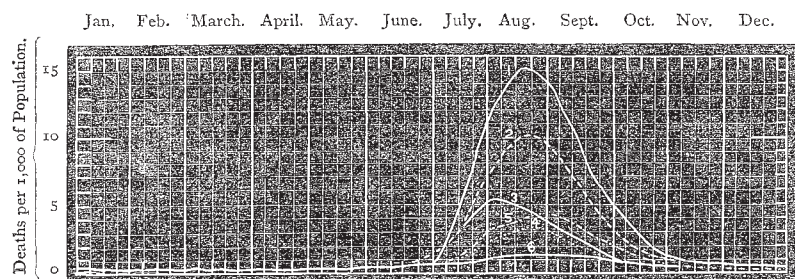


FIG. 2.—Showing the Weekly Deaths from Diarrhoea on the Annual Mortality per 1,000 of the whole population. For Leicester, Curve 1; Liverpool, 2; London, 3; Bristol, 4; Portsmouth, 5; and Edinburgh, 6.

weeks of that month. Though none of the Scottish towns exceed the average at this season, yet Glasgow and Dundee show a decidedly increased mortality, their curves though rising towards never quite reach the average.

In a paper on the mortality of London by Dr. Arthur Mitchell and myself, it has been shown that if the deaths of children under one year of age be deducted from the total mortality, the summer excess disappears from the curve; and it is further shown that, if deaths from diarrhoea be deducted from the whole mortality, the summer excess disappears equally as in the former case. Now, these results hold good for every one of the large towns for which the required data have been published. It follows, therefore, that curves of the death-rate for infants and

diarrhoea have a peculiar interest in discussions of this nature. Fig. 1 gives for Bristol, London, Liverpool, and Leicester curves representing the average weekly mortality among children under one year of age, calculated on the annual mortality of 1,000 of the whole population, the averages being dealt with after Mr. Bloxam's method, according to which each average is calculated so as to include that of the week immediately preceding and that of the week immediately following.

Of all the large towns of England, Bristol has the least summer excess of infant mortality, the highest average of any week being only at the rate of eight calculated on an annual mortality of 1,000 of the whole population. In London, the rate rises to ten in the end of July and beginning of August; and in Liverpool it rises to sixteen, a rate which is also reached by the deaths in Leeds, Hull, and Sheffield, and closely approached by a number

* The substance of this paper was read at the general meeting of the Scottish Meteorological Society, held at Edinburgh on July 13, 1875.

of the other English towns. At Leicester, however, it shoots up to twenty-two, and twenty-four on the second and third weeks of August. As regards the whole year, the lowest averages of infant mortality are—Portsmouth, 4.9; London, 5.7; and Bristol, 5.9; and the highest, Leeds, 8.4; Liverpool, 9.1; and Leicester, 9.4. The season of minimum infant mortality is everywhere during the spring months in the sixteen large towns of England. The smallest spring mortality occurs at Portsmouth, the smallest summer mortality at Bristol, the largest summer mortality at Leicester, and the largest mortality during the other nine months of the year at Liverpool.

Fig. 2 shows the distribution of the mortality from diarrhoea through the weeks of the year, in six large towns, the curves being constructed similarly to, and on the same scale as, those of Fig. 1.

The differences in the rates of mortality from diarrhoea indicated by these curves, which are strictly comparable *inter se*, are very great, and a comparison of the two extremes, Leicester and Edinburgh, is startling; the figures showing that for every one who dies from diarrhoea in Edinburgh during the summer months, eight die in Leicester from the same disease in proportion to the population.

From the beginning of November to the summer solstice, the mortality from diarrhoea is everywhere small, being double, however, in Liverpool and Manchester as compared with London and Portsmouth. It will be observed from Fig. 2 that the curves begin to open out and diverge from each other in the end of June. The curve for Edinburgh on no week reaches the annual rate of 2 per 1,000 of the population. The highest for any week are—Bristol, 3.6; Portsmouth, 3.9; London, 5.5; Liverpool, 10.5; and Leicester, 15.8, these two last places again standing higher than any other of the towns.

The following is a list of all the large towns of Great Britain, arranged in the order of the greater or less prevalence of fatal cases of diarrhoea, during July, August, and September, the figures being the average weekly death-rate for the thirteen weeks, calculated on the annual mortality per 1,000 of the population:—*In England*: Leicester, 9.56; Salford, 7.15; Leeds, 7.02; Manchester, 7.00; Liverpool, 6.28; Sheffield, 6.20; Birmingham, 5.78; Hull, 5.56; Nottingham, 5.36; Norwich, 5.02; Newcastle, 4.61; Bradford, 4.42; Wolverhampton, 4.03; Sunderland, 3.89; London, 3.45; Portsmouth, 2.94; and Bristol, 2.38; and *in Scotland*: Dundee, 2.14; Glasgow, 1.90; Greenock, 1.75; Paisley, 1.71; Leith, 1.45; Edinburgh, 1.23; Perth, 1.08; and Aberdeen, 0.96.

From these results it will be seen that the influence of climate is unmistakable. The summer temperature of the Scottish large towns is several degrees lower than that of the English towns, and we see that every one of the Scottish towns has a mortality from diarrhoea lower than the lowest mortality of any one of the English towns. Of all the large towns of Great Britain the lowest death-rate from diarrhoea is that of Aberdeen, which is at the same time characterised by the lowest summer temperature. Further, the diarrhoea mortality of each town is found from year to year to rise proportionally with the increase of temperature, *but the rate of increase differs very greatly in different towns*. This points to other causes than mere weather, or the relative temperature and humidity of the place, as determining the absolute mortality. Thus the summer temperature of Dundee and Perth is nearly the same, and that of Glasgow and Edinburgh is also nearly alike, the excess being rather in favour of Perth and Edinburgh; and yet the diarrhoea mortality of these two towns is respectively less than that of Dundee and Glasgow. It may therefore be assumed that there is something in the topographical, social, or sanitary conditions of Dundee and Glasgow, which intensifies the evil effects of hot weather on the health of the people, so as to swell, for instance, the death-rate from diarrhoea at Dundee to double that of Perth. At Leicester the summer temperature does not exceed that of Bristol; but while the summer death-rate from diarrhoea at Bristol is 2.38, at Leicester it is 9.56; in other words, it may be assumed that there are local peculiarities affecting the population of Leicester, the effect of which is to quadruple the death-rate from diarrhoea in that town as compared with Bristol. It is to these local conditions we must look for an explanation of the great differences in the death-rate of the different towns. The highest average death-rate per annum for the period under discussion is Liverpool 30.6, Glasgow 30.5, Manchester 30.2, Greenock 39.3, and Paisley 29.0; and the lowest is Portsmouth 20.6, London 23.0, and Aberdeen 23.3. Thus, for every two

who die at Portsmouth, three die at Liverpool, Glasgow, and Manchester.

These facts suggest large inquiries which call for instant and serious attention. As one of the first steps of the inquiry, it is most desirable to know exactly from a weekly registration of the facts, whether the infant mortality is equally distributed among all infants, however nursed, or whether it may not rather be distributed among them in very unequal proportion, according to the manner in which they are fed. Those, for instance nursed at the breast may be much less liable to succumb to diarrhoea in summer than those fed on cow's milk or those fed on slops. The unusually low temperature of December last very largely increased the death-rate everywhere in the British Islands, particularly from diseases of the respiratory organs and from many diseases connected with the nervous system and the skin. The gross number of deaths registered in the different large towns showed that the excess of deaths thereby caused was very unequally distributed over the country. If there had been a more complete system of registration, for all the large towns, it might have been possible, reasoning from the specific diseases which proved to be unusually fatal at each place, to lay the finger on those local conditions, inimical to health, to which the high rate of mortality in each case was due. During the cold months of the year—December, January, and February—the mortality among females is very considerably in excess of that among males in London; for while during these thirteen weeks the average death-rate among males rises 7.8 per cent. above the weekly average of the year, the death-rate among females rises to 11.2 per cent. above the average. Since the facts of mortality for sex are only registered for all causes and all ages, it is impossible to say from the present system of registration how much of the excess of mortality among females in winter is due to sex, and how much to occupation, or even to fashion.

A comparison of the meteorological with the mortality records shows in an impressive manner the influence of particular types of weather in largely increasing or diminishing the number of deaths from particular complaints. Thus, periods of unusual cold combined with dampness in the end of autumn, cold with drought in spring, cold in winter, or heat in summer, are accompanied with a proportionally increased mortality from scarlet fever, whooping-cough (if these diseases be epidemic at the time), bronchial affections, and bowel complaints respectively. Again, as regards diarrhoea, for example, there appear to be certain critical temperatures, such as 55°, 60°, 63°, and 65°, at which as they are reached, the mortality rises successively to greatly accelerated rates. To work out the problem of the relation of the weather and mortality of our large towns, it is indispensable for the comparison of the different towns with each other, that the system of observation be uniform at all places, particularly as regards the hours and modes of observing the temperature, humidity, and movements of the air, and the rainfall; and it is further indispensable that several meteorological stations be established in each of the large towns.

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SCIENTIFIC SERIALS

Mental Science Journals, January, April, July.—The January number opens with an article by Samuel Wilks, M.D., "The Study of the Human Mind from a Physiological View." Dr. Wilks finds no more difficulty as regards the relation of the mind and brain than in "the association of other functions with their respective organs." The main purpose of the writer seems to be to show that men are very much of automata. In this he thinks he has followed Dr. Huxley, who however, if he meant anything, meant that men are a *lot* together automata. The illustrations of the automatism of doctors must be alarming to the nervous and ailing. Example: "Up to the present time I have never seen a single case of leucocythæmia of the lymphatic glands, or the spleen, or simple idiopathic anæmia, without the patient's having been saturated by iodine, quinine, and iron; but no case is yet recorded of these remedies having done the slightest good."—David Nicholson, M.B., continues his "Morbidity Psychology of Criminals," and shows his vigorous common sense in refusing to see that suicide is always an insane act, or that there is any "madness in an idle-minded fellow preferring to live 'like a gentleman' by helping himself directly from moneyed pockets, instead of sweating his life out with a pick